

WMD in Asia-Pacific

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Chapter 1



ASIA-PACIFIC LEADERSHIP NETWORK
FOR NUCLEAR NON-PROLIFERATION AND DISARMAMENT

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Peter Hayes, Tanvi Kulkarni, Chung-in Moon, and Shatabhisha Shetty (eds.), *WMD in Asia-Pacific*. Seoul, South Korea: Asia-Pacific Leadership Network for Nuclear Non-Proliferation and Disarmament, 2022.

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ISBN Digital (PDF): 979-11-978202-0-5

DOI: 10.979.11978202/05

Cover image created by Sophia Mauro, CC BY.

Copyedited and Compiled by Maureen Jerrett.

The papers in this book were first presented at the ‘Weapons of Mass Destruction (WMD) in the Asia Pacific Workshop’, December 1-4, 2020, organized by the APLN. The workshop and the publication of this book are funded by the Asia Research Fund (Seoul).

Surveying the WMD Landscape in Asia-Pacific

Peter Hayes and Shatabhisha Shetty

Introduction

We begin the first section of this chapter by introducing the term “Weapon of Mass Destruction” (WMD) and how it is used in the phrase “WMD landscape”—both of which are widely used but are also conceptually problematic. Next, the chapter summarizes a set of seven nuclear force traits that come with the possession and deployment of nuclear weapons, and that force possessor states to make tradeoffs that characterize their nuclear force posture. These include: making possession of nuclear weapons capacities more or less opaque versus transparent; ensuring that nuclear weapons are always available for use versus are never used without legitimate direction; maintaining centralized, dictatorial authority to use nuclear weapons versus decentralizing and even pre-delegating authority to use; limiting nuclear weapons to counterforce or military-only targets with minimum civilian casualties versus “counter-value” or population targets, often whole cities; and achieving “minimum” deterrence based on imposition of unacceptable risk to a nuclear aggressor (that they would be hit by at least some nuclear retaliation after making nuclear first-strike) versus insisting that a nuclear aggressor faces “mutual assured destruction” irrespective of the level of destruction wrought on the victim of a nuclear first strike. The section explains how nuclear weapons are used to create threat and the paradoxes that result from attempting to use annihilative WMD threats against other states.

In the chapter’s second section (Surveying the WMD Landscape), we present the summary reports from seventeen authors from the three “cockpits” of war and nuclear war in the Asia-Pacific region. The overview begins with Luo Xi’s description of the triangular nuclear competition between the United States, Russia, and China, and their nuclear force modernization programs. Petr Topychkanov expands the scope to include the modernization programs of India, Pakistan, and North Korea to those of the great powers, and the problem that opacity creates for strategic instability. Nick Hansen presents the missile delivery systems of each nuclear-armed state in the

region, and he examines the bewildering diversity of missiles deployed or under development by these states. Peter Hayes delineates the nuclear command, control, and communications (NC3) systems employed by each nuclear-armed state in the region, without which nuclear weapons could not be used and worse, serve as “force multipliers,” and any one of which could lead to loss of control of nuclear weapons and nuclear war. Namrata Goswami shows how states are moving vertically into space for many different WMD-related operations and to compete with each other in this domain in ways that could trigger war and nuclear war. John Carlson takes the horizontal direction and shows how states obtain latent nuclear weapons capabilities in the region and the need to put sensitive nuclear fuel cycle facilities and materials under multinational control. Allan Behm finds that nuclear extended deterrence is based on an inherently incredible bluff and is therefore an irremediably flawed basis for a national security strategy that increases the risk of nuclear war. Jonathan Forman and Alexander Kelle review the history of chemical weapons use in the region in wartime and for deterrence and the problem presented by modern chemical industry and innovation for maintaining the modern non-use norm for chemical weapons. Richard Pilch and Miles Pomper examine how the coronavirus pandemic may enable the re-emergence of banned bio-weapons and the motivation that some nuclear-armed and non-nuclear states may have to obtain chemical weapons in lieu of using or obtaining nuclear weapons.

From these WMD-weapons capacities, we turn to where they might be used in three locations in the WMD-landscape, viz, South Asia, Northeast Asia, and the Taiwan Straits. Rakesh Sood traces the evolution of the Indian-Pakistan conflict embedded in an inherently triangular nuclear threat system with China. Perhaps in no other nuclear-prone conflict is the weight of colonial history so directly linked to the adoption of nuclear forces. As Sood explains, the 1947 partition of Pakistan from India leading to multiple clashes, wars, and now state-sponsored, cross-border terrorism makes it critical that minimal crisis management communication and dialogues commence to reduce the risk of nuclear war in the Indian-Pakistan conflict. In the second zone of possible nuclear war, the Taiwan Straits, Robert Ayson argues that it is urgent to reverse the current spiral of political and military confrontation between the United States and China that recognizes both of vital interests in the Straits and that therefore they must find ways to reduce the risk of war and nuclear escalation such as no-go zones and other confidence building measures. Shifting from East to Northeast Asia, Lee Sang-Hyun contends that the key risk of nuclear war now resides in the asymmetric nature of the DPRK’s conventional, cyber, and

nuclear forces compared with the United States and the ROK and that the only way forward is to engage the DPRK and enable it to become a “normal” state via a peace process.

The search for ways to exit from or eliminate altogether the WMD-landscape is tackled first by Dmitry Stefanovich who notes that Cold War era treaties have mostly unraveled and in any case, did not ameliorate the threats of war in the Asia-Pacific region, making it imperative to identify ways to concretely reduce by measures such as limited deployment zones for launch platforms, testing activities, warhead storage, modernizing hotlines, and applying international law more stringently to nuclear operations in this region. In the Pakistan-India-China nuclear triangle, Feroz Khan identifies a range of trilateral confidence building measures including linked conflict resolution processes, conventional force restraints, and nuclear restraints on unilateral, bilateral, and trilateral bases across a range of possible political, military-nuclear, conventional-nuclear, and economic spheres. To curb possible nuclear proliferation by Japan and/or the ROK, Moon Chung-in examines and dismisses the various arguments mustered by pro-proliferation policy currents in each country, and he notes that it is urgent to reinforce official reluctance to entertain nuclear armament by increased civil society education and mobilization in each state. Tuya Nyamosor shows how the three nuclear weapons-free zones (NWFZs) that exist in the region emerged, compares their regulatory provisions, and notes the near-term applicability of the NWFZ concept to Northeast Asia. Richard Tanter highlights the rapid ratification of the Treaty on the Prohibition of Nuclear Weapons in the region and the practical and legal obstacles to expanding its jurisdiction to encompass the nuclear weapons and nuclear umbrella states.

The third part of this chapter (Conclusion) returns to the seven key tradeoffs that nuclear armament demands each nuclear-armed state make, listed above; and presents the orientation made by each nuclear state from these combined choices. From this review, we find that while they share many of the dilemmas that nuclear armament poses, each attempts to resolve these dilemmas in their own way. For the most part, they do not think alike about nuclear weapons, are not committed to the same norms of behavior or rules of the road, and lack even a common vocabulary for discussing or managing nuclear risk in this region. Nonetheless, we identify eight ways that the risk of nuclear war and other WMD may be reduced and eventually eliminated. These include minimizing the role of nuclear weapons; controlling the diffusion of disruptive technologies and separating nuclear from non-nuclear forces; slowing and reversing the interlinked nuclear domino effect and the arms racing generated by nuclear modernization programs; creating the peaceful conditions that reduce

the risk of war in the first place; undertaking numerous, incremental, and immediate nuclear risk reduction measures in each and every nuclear-armed state; delinking and separating the conflicts in each conflict zone to reverse the potential for cascading conflict up and down the nuclear weapons hierarchy; subordinating nuclear weapons and related deterrence to higher level, existential goals, especially climate change and pandemic response; and expanding the landscape in which nuclear weapons are not allowed into defined zones or are prohibited altogether on a national basis.

The “WMD Landscape”

The Asia-Pacific Leadership Network for Nuclear Non-Proliferation and Disarmament (APLN) informs and energizes public opinion, especially high-level policymakers, to take seriously the very real threats posed by nuclear weapons and to achieve a world in which they are eventually eliminated. To this end, in 2019 APLN convened a group of experts to address critical issues related to nuclear and other weapons of mass destruction (hereafter WMD) in the Asia-Pacific region. The global pandemic that erupted in 2020 disrupted APLN’s plan to bring these experts together and instead, led to a virtual workshop spanning four days in December 2020 at which their work was presented.

This chapter introduces their work. But first, we define what is meant in this book by the term “WMD” and present the concept of a “weapons of mass destruction landscape.” Next, we offer a summary tour of the key features of WMD infrastructure, force structures, capabilities, envisioned uses, and finally, antidotes, at various locations across the Asia-Pacific WMD landscape. Along the way, we find that all nuclear-armed states make seven critical tradeoffs that shape their nuclear identity and their willingness to control and/or disarm their nuclear forces. We conclude this introduction by drawing eight lessons drawn from this review of the WMD landscape in the Asia-Pacific region, each of which has implications for the prospects for resumption of WMD control and disarmament and possible policy measures that might realize such an agenda.

Weapons of Mass Destruction

In this book, WMD is used broadly to refer to weapons that cause mass casualties that distinguish them from non-WMD weapons. Readers should note that the very concept of WMD is contested,¹ politicized, and is not defined legally at the international level although it appears in arms control treaties.² The basic idea was well stated by the 1948 UN Commission for Conventional Armaments as encompassing “atomic explosive weapons, radioactive material weapons, lethal chemical and biological weapons, and any weapons developed in the future which have characteristics comparable in destructive effect to those of the atomic bomb or other weapons mentioned above.”³

Because of the unique effects associated with nuclear weapons, these are the primary WMD addressed in this book. This focus is not to deny the lethal potential of chemical and biological weapons. Indeed, this book identifies where nuclear, chemical, and biological weapons have featured in Asia-Pacific’s WMD landscape and may do so again. But it mentions radiological weapons only fleetingly, and does not cover emerging weaponry *with potential to achieve similar levels of effect to WMD such as swarming drones, cyberattacks on critical infrastructure, etc.*

This choice follows from the physics of nuclear weapons. No non-nuclear WMD match the prompt, vastly destructive power that may be delivered globally and near-instantaneously by

¹ Michelle Bentley outlines these contextually driven shifts in “WMD” in “War and/of Words: Constructing WMD in US Foreign Policy,” *Security Studies*, 22, 2013, pp. 22-68 at: <https://doi.org/10.1080/09636412.2013.757164> and in her *Weapons of Mass Destruction and US Foreign Policy, The Strategic Use of a Concept*, Routledge, 2014.

² Specifically, WMD are referred to in three international treaties that do not define the term, viz, the Seabed Treaty that prohibits “nuclear weapons and other weapons of mass destruction” from being placed on the “seabed and the ocean floor, and in the subsoil thereof”; the Outer Space Treaty that bans placement of “nuclear weapons and other weapons of mass destruction” on celestial bodies except Earth; and The Strategic Arms Reduction Treaty applies the ban to include fractions of Earth’s orbit. See Z. Kallenborn, *Are Drone Swarms Weapons of Mass Destruction*, Future Warfare Series No. 60, The Counterproliferation Papers, Future Warfare Series No. 60, U.S. Air Force Center for Strategic Deterrence Studies, Air University, Maxwell Air Force Base, Alabama, May 6, 2020, p. 5. The phrase also appears in the preambles to the Latin American nuclear weapons free zone treaty and in the proposed Middle Eastern WMD-free zone, and the biological and chemical weapons convention, but *not* the Treaty on the Nonproliferation of Nuclear Weapons. See S. Carus, *Defining “Weapons of Mass Destruction,” Center for the Study of Weapons of Mass Destruction*, Occasional Paper, No. 8, National Defense University Press, Washington, D.C., January 2012, p. 21. It also appears in the Guidelines of the Missile Technology Control Regime agreements, and in the UNSC 2004 1540 resolution related to regulating non-state actors; and UNSC resolution 1540 (2004) that requires all states to “fulfil their obligations in relation to arms control and disarmament and to prevent proliferation in all its aspects of all weapons of mass destruction.” Interestingly, resolution 1540 explicitly defines the scope of the resolution to apply to nuclear, chemical, and biological weapons (and defines these weapons) but does not define the term WMD. UNSC Resolution 1540, April 28, 2004, at:

[https://www.un.org/ga/search/view_doc.asp?symbol=S/RES/1540%20\(2004\)](https://www.un.org/ga/search/view_doc.asp?symbol=S/RES/1540%20(2004)) However, the 1995 UNSC resolution 984 on assurances to NPT-party non-nuclear weapons states is delimited to nuclear weapons only.

³ *Ibid*, S. Carus, *Defining “Weapons of Mass Destruction,”* p. 5 and 12.

nuclear weapons, nor the centrality of the threat of nuclear annihilation to the conduct of international relations since World War II. Arguably, only nuclear weapons pose a clear and present danger to the existence of the human species—especially when use in nuclear war may degrade or even destroy human resilience and capacity to manage the other existential threats that afflict humanity.

A further complication is the intimate relationship between potential use of nuclear weapons and conventional weapons which may accumulate enormous casualties over time in large-scale conflicts. Paroxysms of conventional war likely will be the launch pad for any plausible nuclear war. In many respects, nuclear and conventional weapons are joined at the hip and, as will be evident in the chapters on regional flashpoints in this book, cannot be separated.

The “WMD Landscape”

Policymakers and analysts often refer to the “WMD landscape” as if the contours and features of this “threat landscape” can be surveilled and mapped like any geo-spatial terrain.⁴ For example, for Paul Bernstein and his colleagues at the US Center for the Study of WMD, the term refers to “The complex and dynamic nuclear landscape ...along at least four axes: regional nuclear proliferation, nuclear terrorism, great power nuclear relations, and the security implications of increased interest in nuclear energy.”⁵ For the US defense Intelligence Agency, it covers: “1. Increasing numbers or capabilities of weapons in existing programs. 2. Enduring security threats to weapons and material. 3. Countries developing new delivery systems with increased capabilities. 4. Countries developing nuclear weapons with smaller yields, improved precision, and increased range for military or coercive use on the battlefield. 5. Countries developing new nuclear weapons without conducting large-scale nuclear tests.”⁶ For John Krzyzaniak writing in *The Bulletin of the Atomic Scientists*, it describes a risk ledger—in 2020, for example, “new nuclear risks emerged,

⁴ For example: “Biological weapons occupy an interesting role within the WMD landscape as contagious pathogens can be used to create a large strategic outbreak, non-contagious pathogens can target operational forces or populations, and toxins are effective for assassinations.” Patrick Terrell, “North Korean Collapse: Weapons of Mass Destruction Use and Proliferation Challenges,” The North Korea Instability Project, June 2017, p. 8, at: <https://www.38north.org/wp-content/uploads/pdf/NKIP-Terrell-WMD-Use-and-Proliferation-Challenges-062217.pdf>

⁵ P. Bernstein et al, “The Future Nuclear Landscape,” CSWMD Occasional Paper 5, April 1, 2007, p. 1, at: <https://inss.ndu.edu/Media/News/Article/693747/the-future-nuclear-landscape/>

⁶ US Defense Intelligence Agency, *Global Nuclear Landscape 2018*, February 2018, at: https://dod.defense.gov/portals/1/features/2018/0218_NPR/img/Global_Nuclear_Landscape_2018_Final.pdf

old risks reappeared, and, although no risks really went away, there were some positive signs.”⁷ For Vipin Narang, it means simply “the strategic environment.”⁸

Given that this widely used phrase has no conventional meaning, what exactly are the features of “WMD” that constitute such a landscape and signify a possessor’s WMD capacity and intentions that together make up threat?

Typically—at least in the West—WMD in the form of nuclear force structures are described with reference to those that ensure its survivability, its ability to strike an adversary and overcome defenses, and its targeting range.⁹ Metrics are assembled such as numbers of warheads, missile “throw-weight” and explosive power, numbers and diversity of naval, aerial, land-based delivery platforms that constitute monads, dyads, or triads, and range of various delivery system. Often such portrayals are simplistic, speculative, and sometimes downright deceitful. Such portraits may be supplemented with an attributed declaratory and operational doctrine, a strategic-cultural profile, and an account of the supporting nuclear-industrial infrastructure.¹⁰

Unfortunately, this type of depiction reduces the true complexity of a nuclear force to a few common attributes that in reality amount to one nuclear-armed state’s threat perception projected onto another. Worst case assumptions predominate, and adversarial intention is rarely addressed, let alone interrogated while the rationality and legitimacy of one’s own force structure are rarely examined. Some analysts attempt to overcome the limits of parochial analysis by investigating the

⁷ John Krzyzaniak, “The 2020 nuclear landscape, in the shadow of a pandemic,” *Bulletin of the Atomic Scientists*, December 29 2020, at: <https://thebulletin.org/2020/12/the-2020-nuclear-landscape-in-the-shadow-of-a-pandemic/>

⁸ A. Rej, “Vipin Narang on the global nuclear landscape: hype and reality,” *The Diplomat*, April 13, 2020, at: <https://polisci.mit.edu/news/2020/vipin-narang-global-nuclear-landscape-hype-and-reality>

⁹ David Arcenaux and Kyungwon Suh describe these typical parameters as specified by Albert Wohlstetter; and then develop metrics that describe the delivery platforms that contribute to these three critical attributes, and the diversification of these platforms that enhance the putative deterrence capacity of a state (they identify seven, viz: “submarine-launched missiles, strategic land-mobile missiles, rapid fueling technologies, nuclear-tipped cruise missiles, multiple independently targetable reentry vehicles, deliverable strategic nuclear weapons, and tactical nuclear weapons.” In “Nuclear Platform Diversification: A New Dataset,” unpublished paper, May 18, 2021 via email. See video seminar, David Arcenaux, “Nuclear Platform Diversification: A New Dataset,” *Managing the Atom*, Harvard University, May 5, 2021, at: https://harvard.zoom.us/rec/play/tRBavuokQb5laqQvzMHH-2upXaWBvZl2P8hq7gOGtHvlVzWmXTwzMjzCkxOGanX8gxIZuE_mdUVSze-r.dKBHZuvtjR0Nd0XE?startTime=1620237212000& x zm rtaid=AhPK9lEnSagu0cQ1plfstQ.1621357119985.a8a436189e56e22a2c8dc5a384487180& x zm rhtaid=35

¹⁰ K. Kartchner et al, *Strategic Culture and Weapons of Mass Destruction, Culturally Based Insights into Comparative National Security Policymaking*, Springer-Link, 2009, at: <https://link.springer.com/book/10.1057/9780230618305>

determinants of nuclear force structure and the variation within the diversity thereof by quantitative and statistical analysis of “domestic constraints, bureaucratic politics, conventional threats, nuclear rivalries, and nuclear alliances.”¹¹ But most often, detailed accounts proceed by stand-alone or comparative, qualitative case studies grounded in history, and structured by assumptions and hypothetical arguments that attempt to derive general lessons for strategic practitioners and policymakers.¹² These too exhibit bias, especially in the selection of cases.¹³ And, much of the literature is focused on Euro-Atlantic security affairs and systematically ignores the historical experience of WMD in Asia-Pacific. Yet, many of the nuclear “near-misses” during the Cold War and most of the post-Cold War near-misses occurred in the latter region, not the Atlantic-European security sphere.

In this chapter—drawing on the subsequent chapters—we use a broad conceptual framework shown in Table 1 to capture the choices made by all nuclear-armed states, whether on purpose or by default. These include making possession of nuclear weapons capacities more or less opaque versus transparent; ensuring that nuclear weapons are always available for use versus are never used without legitimate direction; maintaining centralized, dictatorial authority to use nuclear weapons versus decentralizing and even pre-delegating authority to use; limiting nuclear weapons to counterforce or military-only targets with minimum civilian casualties versus “counter-value” or population targets, often whole cities; and achieving “minimum” deterrence based on imposition of unacceptable risk to a nuclear aggressor (that they would be hit by at least some nuclear retaliation after making nuclear first-strike) versus insisting that a nuclear aggressor faces “mutual assured destruction” irrespective of the level of destruction wrought on the victim of a nuclear first strike. These abstract choices are revisited at the end of this Introduction in the context of the Asia-Pacific region as represented in subsequent chapters.

¹¹ E. Gartzke, J. Kaplow, R.N. Mehta, “The Determinants of Nuclear Force Structure,” *Journal of Conflict Resolution*, 58:3, 2014, p. 486, at: <https://journals.sagepub.com/doi/abs/10.1177/0022002713509054>

¹² Bennett and Smoke present a summary account of this approach in A. George, A. Bennett, *Case Studies and Theory Development in the Social Sciences*, MIT Press, Cambridge, MA, 2005. .

¹³ See the penetrating critique in C. Achen and D. Snidal, “Rational Deterrence Theory and Comparative Case Studies,” *World Politics*, 41:2, January 1989, pp. 143-169.

Table 1: Nuclear Force Posture Tradeoffs

Transparency	Opacity
Certainty	Uncertainty
NC3 Negative Bias-Never Use by Mistake	NC3 Positive Bias-Always Available for Use
Dictatorial Decision-Making	Group Decision-Making
Counterforce Targeting	Countervalue Targeting
Maximum Deterrent	Minimum Deterrent
Interdependent Nuclear Security	Autarchic Nuclear Security

*Table 1 Note: NC3 stands for nuclear command, control, and communications.

How these nuclear postures generate nuclear fear in the minds of their adversaries, and how nuclear threat is perceived and experienced, varies greatly across each region. Each nuclear-armed state reveals different declaratory rhetoric, deployments, and force disposition such as alerts or forward-deployments to send signals about intention to nuclear adversaries who perceive them as “early warning.” For such “messaging” to work, nuclear-armed states need some kind of shared vocabulary.

One such language is that of the nuclear forces that speak for themselves. Nuclear forces are embodied in physical locations such as factories that make fissile material for warheads—or the warheads themselves--scattered across the landscape. These sites may be identified and observed from afar—although satellites in space may be as close as one can get to some sites. Among the most threat-laden fixtures are silos, airfields, and ports, and related mobile delivery platforms such as submarines or bombers that may be tracked by various technical apparatus. There are also nuclear warhead testing sites, and missile testing ranges which may be observed close up or, depending on available national technical means, from great distance. These physical structures are the terrain contours and architecture of the force structure that constitute the visible WMD landscape. However, it may also contain “blank spots” that are kept hidden, or they only exist so briefly that only states that are pre-positioned and equipped can map some critical elements of WMD (such as launch exhaust trails on satellite infrared sensors, missile trajectories on radar and telemetry from re-entry vehicles).

When the object of analysis itself is difficult to discern in a given locale, then standard qualitative and quantitative accounts of nuclear forces based on attributed indicators are essentially

speculative because they are based on interpretation which is notoriously subject to bias, cultural assumptions, or political bias, and being held secret, not subject to well-informed cross examination. At best, these accounts provide only indirect indication of the intention that may be embodied in these physical artifacts. Minimal disclosure and concealment of physical forces are standard practice of nuclear-armed states in this region. Even the United States practices a “neither-confirm-nor-deny” policy when it comes to nuclear weapons. A haze of ambiguity hangs over and obscures the WMD landscape. Clarity based on transparency is rare and often provided by mistake rather than on purpose.

Yet all nuclear-armed states—even the most opaque—need to provide *some* information about their capacity to adversaries, if only to keep them guessing or to remind them that deterrence is operative, even if the adversary has no immediate intention to attack. Otherwise, ignorance is bliss for an adversary and nuclear weapons have no utility. Thus, nuclear weaponeers must carefully calibrate what to reveal or to deny in order send messages about their capacity and intention to adversaries if they are to affect the perceptions and shape the behavior of adversaries and allies, not to mention domestic audiences. Indeed, to maintain a constant dark cloud of nuclear threat over a WMD landscape requires impressing adversaries that WMD threats are a clear and present danger, and not a figment of someone’s disturbed imagination. Nuclear-armed states go to extraordinary lengths to maintain this perceived threat, for example, by staging nuclear war “exercises,” mating warheads to missiles or loading them onto bombers at times of high tension, increasing alert levels at missiles and airfields, moving missiles around and dispersing bombers, or putting submarines to sea, to name but a few. In short, nuclear-armed states try hard to impress the other of their ability to bounce their rubble and to reduce them to a smoking, radiating ruin in a nuclear war if they don’t change their tune or back off.

Unfortunately, the most important aspect of observable nuclear force deployment is not the revealed capacity per se, but what it says about intention because the latter is what makes the revealed capacity a threat. Intention is not a directly observable feature of the WMD landscape because it inheres in intangibles such as nuclear threat rhetoric, operational doctrine in manuals, organizational structures, analog and digital control systems, the personae of nuclear commanders manifested in their decision-making style, and the decision-making process itself that first constitutes their agency and then enacts their intentions in the form of orders translated into actions that ultimately—should nuclear war erupt due to loss of control of the weapons, accident, or

purposeful strikes—become visible as nuclear detonations in the observed landscape of targets likely observed by only a few survivors or possibly no-one at all and therefore, devoid of meaning. Thus, while it is possible to glimpse the nuclear forces and supporting physical infrastructure, there is no way to divine intention with any surety or clarity because the meaning of nuclear threats is always ambiguous, uncertain, and inherently irrational. Often, decision-makers do not articulate their intentions even as they act let alone that of their adversaries. Even with the benefit of hindsight, it is almost impossible to confidently specify intentionality due to the notoriously poor historical veracity of memoirs and the biases and failures of memory on the part of decision-makers.

A survey of the WMD weapons landscape in the Asia-Pacific region encounters a further methodological obstacle in that “Asia-Pacific” is an Orientalist construct that defines the region with reference to what it is not—that is, not Europe or the United States. “Asia-Pacific” is not a unit of geo-political behavior in itself, nor a shared identity for anyone who comes from or acts in this geographical area. As will become evident in this book, although the dilemmas encountered when nuclear weapons are introduced into a conflict are universal, the specific forms of WMD in each part of “Asia-Pacific” are locale and conflict-specific and must be analyzed separately at each site of potential use at the global, regional-multilateral, and bilateral levels. As we shall see in subsequent chapters, the dynamics of generating threats using WMD—especially from nuclear weapons--in this region are distinctive and do not follow any playbook from the Cold War or other regions.

Chemical weapons have a long history and were used in modern war until banned by the Chemical Weapons Treaty in 1997—and since then, by outliers such as Syria. Biological weapons also have a long history of development with only isolated deployment in the modern era since they were banned in 1975. And other than two actual nuclear attacks in 1945, nuclear weapons have not been used since then. Only the threat of nuclear use has been deployed, widely, to structure international relations by forcing leaders to take the risk of nuclear war and self-damage into account in their decisions. Thus, to date, it is primarily the prospect of resumed WMD use that is the specter that defines the WMD landscape, not widespread use itself.

Yet, it is worth repeating. The worst kind of WMD use, nuclear war, has been fought only once, at Hiroshima and Nagasaki in August 1945, and then only against a non-nuclear state. Since then,

no-one has ever exchanged nuclear weapons fire in a war, only nuclear threats. The next use of nuclear weapons would transform the landscape in which people live in radical ways, stopping time, annihilating nature, incinerating whole cities in a flash, eliminating all meaning invested by humans. Until nuclear next-use, all this war-making is imaginary—until it's not. Ironically, even the envisioning of nuclear war has no common basis because the interpretation of the nuclear bombing of Hiroshima and Nagasaki, and of the many near-misses since then, diverge across the states party to these conflicts--the claims of *hibakusha* (survivors of nuclear bombing) to define the past as the basis of future nuclear horror notwithstanding. It is incumbent upon us, therefore, to envision these horrific futures anew as precisely as possible to first understand, and second avoid them, which is the reason for taking this excursion across the WMD landscape.

Surveying the WMD Landscape

With these qualifications in mind, we will traverse the WMD terrain guided by twenty authors who are deeply imbued with knowledge of each state and conflict involving WMD, with Asia-Pacific defined loosely as stretching from South Asia to Northeast Asia. We proceed in three stages—by first mapping the lowlands and badlands of conflict zones, then examining how and where conflicts may erupt into paroxysms of violence due to the presence or use of WMD, and finally, mapping some of the pathways whereby the landscape may be left behind, rid of WMD threats either partly or forever, to be replaced by a “post-WMD” or “WMD-free” landscape, the interim version of which is known as a WMD- or nuclear weapons-free zone.

Thus, the first section establishes baseline knowledge about what is known or may be inferred about the status of WMD in the Asia-Pacific region at various locales and trends in WMD proliferation and deployment in regional conflicts. The second section focuses on where wars involving WMD might begin in three locations—South Asia, the Taiwan Straits, and Korea—while examining how asymmetric force structures and future proliferation may increase the risk of the next-use of WMD, especially nuclear weapons, in each conflict. The third section examines how the risk of wars involving WMD in the region might be reduced or even eliminated altogether.

Great Power Nuclear Triangle—the Rise of China

The book commences by describing the baseline status of and trends in vertical and horizontal proliferation of WMD across the entire region. Writing from the China corner of the great power strategic triangle with the United States and Russia, Luo Xi observes that this relationship has become intrinsically trilateral rather than primarily bilateral as it was during the Cold War. She notes that many of the road rules and signposts designed to keep the United States and Russia (formerly the Soviet Union or FSU) from colliding have been abandoned, and that all three of nuclear great powers are modernizing their nuclear forces and introducing “post-ballistic” missile technologies that create new risks superimposed on many of the old. She emphasizes that the nuclear game at the global level is now more complex because each player sizes their nuclear force not only against the other great powers who field triadic nuclear forces with global reach, but against a range of middle and small powers, and even against non-state actors.

Importantly, she argues that “unrestrained nuclear competition between the United States and Russia may complicate future bilateral arms control negotiation and potentially effect China’s cognition of its own nuclear retaliatory capabilities.” That is, China is not a passive actor on the receiving end of nuclear threat, if it ever was. In the past, China relied on its ability to absorb a nuclear first strike but then retaliate to inflict enough damage to not only deter such a strike, but also armor it against any attempt to use nuclear threats against it as was attempted by the United States during the Korean War and aftermath in the Taiwan Straits and the 1969 Soviet-China clash at the Amur River.

Today, however, China may respond directly to possible US deployment of previously prohibited ground-based intermediate-range missiles in the western Pacific. It may increase the survivability of its nuclear forces by deploying multiple warheads on missiles and experiment with hypersonic boost-glide vehicles that reduce warhead delivery time and early warning to even less than that associated with ballistic missiles. In fact, some claim that China has already done so, in advance of Russia and the United States.¹⁴ Finally—and this development became public after the writing

¹⁴ M. Yeo *et al*, “Hypersonic and directed-energy weapons: Who has them, and who’s winning the race in the Asia-Pacific?,” *Defense News*, March 15, 2021, at: <https://www.defensenews.com/global/asia-pacific/2021/03/15/hypersonic-and-directed-energy-weapons-who-has-them-and-whos-winning-the-race-in-the-asia-pacific/>

of this chapter, China may be expanding its ground-based missile force substantially with three new missile fields with up to two hundred silos under construction.¹⁵

Luo concludes that the three great nuclear powers should undertake urgent nuclear risk reduction measures in the context of the P5 group, that is, the five permanent members of the UN Security Council (all of which are nuclear-armed). But she notes also that China may be more likely to participate in arms control than arms reduction talks because the former are not only inherently more comprehensive in nature than the latter—requiring, for example, that emerging technologies and nuclear-conventional entanglement be addressed—but may also require the participation of other powers with relatively smaller arsenals such as those deployed by the United Kingdom, France, and India. Also, a comprehensive and inclusive nuclear arms reduction dialogue would necessarily encompass how best to resolve regional conflicts in Europe, the Middle East, South Asia, and Northeast Asia so that they are no longer potential regional theaters of nuclear war, with the potential to escalate to global nuclear war between the three nuclear great powers. She suggests that a multilateral dialogue should aim to persuade nuclear-armed states to switch from “launch under warning” to “launch under attack” with a related operational policy whereby nuclear weapons are kept undeployed at central depots on low alert levels, concurrent with declaration of a common “No First Use” policy.

¹⁵ J. Warrick, “China is building more than 100 new missile silos in its western desert, analysts say,” *Washington Post*, June 30, 2021, at: https://www.washingtonpost.com/national-security/china-nuclear-missile-silos/2021/06/30/0fa8debc-d9c2-11eb-bb9e-70fda8c37057_story.html

H. Kristensen, “China’s Expanding Missile Training Area: More Silos, Tunnels, and Support Facilities, February 24, 2021, at:

<https://fas.org/blogs/security/2021/02/plarf-jilantai-expansion/>

M. Korda, H. Kristensen, “China Is Building A Second Nuclear Missile Silo Field,” July 26, 2021, at:

<https://fas.org/blogs/security/2021/07/china-is-building-a-second-nuclear-missile-silo-field/>

James Cameron examines the differing interpretations of this construction in “China’s Silos: New Intelligence, Old Problems,” *War on the Rocks*, August 12, 2021, at: https://warontherocks.com/2021/08/beijings-silos-new-intelligence-old-problems/?utm_source=AM+Nukes+Roundup&utm_campaign=c0a7b157d9-EMAIL_CAMPAIGN_2018_07_25_12_19_COPY_01&utm_medium=email&utm_term=0_547ee518ec-c0a7b157d9-391728633

See also H. Kristensen, M. Korda, “China’s nuclear missile silo expansion: From minimum deterrence to medium deterrence,” *The Bulletin of the Atomic Scientists*, September 1, 2021, at: <https://thebulletin.org/2021/09/chinas-nuclear-missile-silo-expansion-from-minimum-deterrence-to-medium-deterrence/>

Modernization of Nuclear Forces

Next, Petr Topychkanov assesses the modernization of nuclear force postures, especially the decision to stop de-emphasizing nuclear weapons by expanding the roles attributed to nuclear weapons in rhetoric, operational doctrines, war plans, and deployments. He observes that this trend is part of a broader shift to geostrategic competition and distrust, and resurgence of the concept of limited nuclear warfighting both within the global nuclear triangle of nuclear great powers, but also at the regional level in South Asia and Northeast Asia.

Thus, as soon as the United States withdrew from the US-Russian Intermediate Nuclear Forces (INF) treaty, it tested an extended-range ground-launched cruise missile, with clear intent to deploy it against China (which was not party to the INF treaty and has concentrated its nuclear-armed missile development in this intermediate range capable of attacking US west Pacific allies as well as US territory such as Guam).

Russia too, he notes, is developing and testing new nuclear weapons such as the Burevestnik nuclear-powered long-range cruise missile, the Poseidon nuclear-powered underwater drone, the Kinzhal air-launched supersonic missile, the Sarmat silo-based heavy ballistic missile, and the Avangard hypersonic glide vehicle while rapidly restocking and modernizing most of its existing strategic rocket force.

For its part, according to Topychkanov, China maintains that the “sole purpose” role of nuclear attack is to employ nuclear weapons only in response to a nuclear strike, rather than keeping open the option to use them in a conventional war, as is explicitly kept open by the United States, Russia, and Pakistan. However, China remains opaque as to how many nuclear weapons it deploys leaving open the possibility that it is expanding its arsenal significantly. At the same time, its apparent intent to deploy nuclear ballistic missile submarines along with nuclear warheads, presumably outside China’s territorial waters, suggests a major shift in the previously conservative control system in China’s nuclear arsenal to include possible pre-delegation of use of nuclear weapons to deployed submariners.

Topychkanov explains that India has earned a place at the great power table but is also trapped in counterforce dilemmas in its relationship with Pakistan. It has obligated itself to observe “no first use” against China and Pakistan, but Pakistan has not reciprocated and relies heavily on the threat

of early nuclear use to deter an Indian conventional war against it, especially over Kashmir. At the same time, India lacks nuclear forces able to survive a Chinese nuclear counterforce attack.

Finally, he concludes that the DPRK presents a particularly problematic case due to its nuclear opacity. The DPRK has not made available an official nuclear doctrine that shapes its posture and sets external expectations as to what to expect of its nuclear forces either routinely or in a crisis. This opacity reduces its adversaries to a guessing game as to what the DPRK's nuclear forces are for in a crisis—compellence, deterrence, or some other purpose such as domestic mobilization around a unified “nuclear weapons identity.”

Topychakanov concludes that increasing the transparency of nuclear forces is the most important overarching imperative that bears on every nuclear-armed state in the region, and it is central to regaining “strategic stability” in international relations, that is, stable mutual deterrence that ostensibly is the reason to have nuclear weapons in the first place.

Nuclear-Capable Missiles in Asia-Pacific

A nuclear weapon is often reduced to a nuclear explosive device that is “weaponized” into a deliverable warhead. But a warhead without a delivery system can only blow up its possessor; and all delivery systems also require launch platforms and associated NC3 infrastructure. A nuclear weapon therefore consists of the combination of NC3, launch platform, delivery system, and warhead. This is a more expansive but also more logical definition of a nuclear weapons than the narrower, conventional definition as a nuclear explosive device that releases energy from a controlled fission or fusion reaction.¹⁶

Nick Hansen describes the incredible array of missile delivery systems deployed or under development by the six nuclear weapons states in the Asia-Pacific region, including those that employ fixed or mobile land-based launch platforms, submarines, and aircraft-launched missiles. Nuclear weapons states also have non-missile delivery systems for gravity nuclear-bombs, torpedoes, and tactical nuclear weapons for ground-use, but they rely on ballistic missiles for the most part due to their combined speed of delivery and geographical reach to overwhelm any

¹⁶ For example, a nuclear weapon is defined as: “Complete major assembly (i.e., implosion, gun, or thermonuclear) in its intended ultimate configuration, or in a disassembled configuration for a temporary period of time, which, upon completion of the prescribed arming, fusing, and firing sequence, is capable of producing the intended nuclear reaction and release of energy,” *Glossary, US Department of Defense, Nuclear Matters Handbook (2020 revised)*, at: <https://www.acq.osd.mil/ncbdp/nm//NMHB2020rev/glossary.html>

possible defense against nuclear attack, although cruise missile-delivered nuclear weapons are part of the picture for lesser nuclear wars using aircraft-launched nuclear weapons.

In each nuclear-missile endowed state, Hansen traces the evolution of their missile arsenal into a breathtaking diversity of missile systems. Although there are many possible drivers in each nuclear-armed state that explain this bewildering diversity, including domestic determinants such as service rivalry, political-bureaucratic interest and pork barrel politics, the cumulative momentum built up by decades of scientific and technical missile (and space rocket) R&D and testing, engineering cultures, and design philosophies that affect accuracy and reliability performance, the military-industrial base and availability of critical materials such as those needed for liquid versus solid propellants and hardware such electronics needed for guidance systems, access to testing sites to miniaturize warheads deployable on missiles or to test the missiles themselves over instrumented test ranges, doctrinal dogma such as the necessity of the three-legged nuclear triad and related counter-value (low accuracy, big warheads to kill cities) versus counterforce (high accuracy, small warheads needed to kill military targets) requirements, the major factor undoubtedly is geo-strategic, that is, the nature and number of adversaries, their location relative to a given nuclear-armed, missile-endowed state, and the target set and challenge presented by the target states' nuclear and conventional forces including their vulnerable NC3 nodes, the wily exploitation of the adversaries worst fears whatever the true capability of one's own proliferating missile types, and the competitive dynamic between nuclear missile armed adversaries that leads to competitive, matching development and deployments irrespective of the military logic of system acquisition and possible use.

Thus, there are many historical trajectories for each nuclear-armed states missile proliferation with varying combinations of unilateral and competitive acquisition of missile capabilities stretching over many decades, as is the case with US-FSU/Russian or US-Chinese missile acquisition, but also radically different pathways taken by breakout states like the DPRK that skip some phases altogether to leapfrog into long-range missile status, whereas, others like Pakistan remain focused on intermediate and short-range missiles. In short, Hansen argues, the strategic context matters when it comes to understanding the profusion of missiles in Asia-Pacific.

Hansen observes that arms control and disarmament treaties and agreements that controlled the vertical (by nuclear-armed states) and horizontal (by non-nuclear armed states) proliferation of

missiles has largely collapsed, and the remaining controls are unravelling quickly. As more states acquire missiles, including new missile types such as hypersonic delivery systems launched from missiles the area covered by their missile range begins to overlap, creating a new layer of complexity and potential risk to nuclear crisis and possible escalation. It is urgent, therefore, to control not only nuclear weapons, but also missiles, to reduce and eventually eliminate the risk of nuclear war—a topic addressed in later chapters of this book.

NC3 “Force Multipliers”

Peter Hayes notes that nuclear or missile test sites, nuclear fuel cycle or warhead production factories, and nuclear delivery sites and platforms such as silos, ports, or airfields, are all visible either at least fleetingly or all the time. But when it comes to nuclear command, control, and communications (NC3), these systems are much harder to identify and to characterize. Nuclear command posts may be identified above or below ground where supreme political and military commanders likely would assemble to deliberate and then fire their nuclear weapons—if they were not “decapitated” first in a nuclear preemptive strike by their adversary. Some of the larger early warning systems such as radars or satellite ground stations can be observed, as can the large antennas that transmit orders over very low frequency radio signals to submarines with nuclear-armed missiles.

But for the most part, NC3 is nowhere to be seen on the WMD landscape. Yet, without nuclear command-and-control and their supporting information sensors and communications infrastructure, nuclear weapons could not be used. Moreover, high performance NC3 multiplies the lethality of the weapons themselves by increasing their speed and precision. Ironically, these systems themselves are also the most important targets to be hit early in a nuclear war, even more so than nuclear weapons themselves.

What matters when it comes to NC3, Hayes argues, is not how one or another NC3 system stands alone but how adversarial NC3 systems interact to create risks which may originate in potential misreading of early warning information (“false positives” that advise leaders that their state is under nuclear attack when it isn’t), technological failure (which could lead to accidental detonation), or organizational pathology (whereby an individual or a unit acts in a way that leads to nuclear escalation contrary to the intention or orders of the supreme nuclear command).

Why does NC3 matter? Since the Cold War began, a serious incident between nuclear weapons states with the potential to escalate to nuclear war has occurred on average once every three years. In each of these, NC3 was integral to the near-miss. In 2022, the beat goes on.

The three great power nuclear-armed states —the United States, Russia, and China —now have global or near-global reach. Each has satellite and ground-based communication and observation—especially radar—sensors that match their long-range nuclear-weapon delivery platforms and systems. Their NC3 systems combine Cold War analog legacy systems with ultra-modern digital systems, often shared with conventional forces. In all three cases, these global NC3 systems are complex, rely on high technology, and likely will fail badly under the real stress of nuclear attack, making it difficult to control nuclear war or to terminate it once one breaks out.

At the other end of the spectrum are small nuclear-armed states like the DPRK. Pyongyang has likely built an NC3 system that is dedicated solely to nuclear forces to preserve Kim Jong Un's sole control of nuclear weapons. Thus, Kim Jong Un likely relies on a relatively simple NC3 system with political commissars who manage the warheads, and the military who deploy missiles ready to be mated with warheads.

Northeast Asia is not the only location with multiple NC3 systems in play in the Asia-Pacific region. Given that India has an advanced scientific and engineering infrastructure and a globally competitive IT sector, one can safely infer that India's current NC3 relies heavily on cable, especially fiber-optic cable, microwave links, and radio links including non-dedicated satellite links between nuclear warhead sites that are sufficient to support dispersed missile launcher sites and fighter-bomber units on various airfields. However, how effective such communications are to support India's mobile nuclear weapons remains an open question.

Like India, Pakistan's physical NC3 infrastructure of command centers, communication nodes, networks, and early warning systems are not robust, especially those related to its deployment of tactical nuclear weapons near the contested Kashmiri border in times of war.

Hayes notes that all nuclear-armed state in the Asia-Pacific region confront five shared NC3 dilemmas. These are: (1) the contribution of NC3 to the risk of nuclear war due to its inherent vulnerability and the incentive to strike NC3 systems first or lose one's own NC3 system, (2) NC3 modernization and disruptive technology, (3) nuclear decision-making and commander

accountability under international law pertaining to NC3, (4) complexity and the global NC3 system, and (5) the pandemic-nuclear nexus and NC3.

Hayes points out that there is no consensus as to what procedures should be implemented in all NC3 systems to ensure a minimum of accountability in the form of checks and balances to block manifestly illegal and insane strike orders from being implemented. It is for this reason that the Treaty on the Prohibition of Nuclear Weapons includes NC3 systems in its scope, although it has yet to develop a practical set of recommendations that would allow NC3 systems to align with the core values of this treaty. He proposes a Global NC3 Code of Conduct that might serve as an interim step to more stringent controls on NC3 systems.

Emerging Asia-Pacific Space Powers Capabilities

Namrata Goswami extends the WMD landscape from Earth into space. Long dominated by the United States and Russia, but with China catapulting past Russia in the last decade and India also entering into the space domain, the strategic landscape now includes not only the atmospheric exit, brief transit through space, and atmospheric re-entry of warheads during tests, or, as would occur in a nuclear war, hurtling towards targets, but also near-permanent constellations of geostationary or orbiting military intelligence and communication satellites that are integral to collecting intelligence on targets and communication of nuclear strike orders.

Thus, just like US Space Command and Strategic Command that provide space-based support for nuclear forces along with a vast array of ground-based stations and terminals, Chinese People's Liberation Army (PLA) now has its own Space Force (PLASSF) which, unlike the US space force, fuses China's military and civilian space sectors. China's strategic goal, writes Goswami, is to displace the United States as the premier space power, and to secure itself from US military attack on ground or in space. Like the United States and Russia, China now has its own geospatial positioning system based on satellites endowing it with an independent ability to guide missiles to targets such as aircraft carriers—provided it can find and track them with other intelligence means.

Although it lags behind China, India too invests heavily in space launch capacity, has sent missions to the Moon and Mars, and also like China, used a missile to destroy a low-earth-orbit satellite. Pakistan has advanced missiles able to provide space launch rocket services but lags far behind India in satellite and space activities. But to compete with India and to support long-distance, offshore (especially submarine) operations, Pakistan will likely seek China's assistance to develop

space-based capacities just as it did with its nuclear weapons program. Japan is responding to China's expansion into space by developing its own space launch and satellite programs. The DPRK is the weakest entrant into the space race, but its long-range missiles give it the capacity to boost payloads into space that might eventually equip it with independent satellites.

Goswami envisions that war involving these space-based assets could erupt from many different angles given the number of conflict dyads that exist in the Asia-Pacific region. "Because conflict systems are linked," she avers, "we can expect horizontal proliferation specifically where competition is pre-existing in dyads. Japan's counterspace capabilities will encourage development of counter-space capability by North Korea. North Korea, already incentivized to create an ASAT to deter the United States, will accelerate to keep pace with any South Korean counterspace developments. Pakistan, seeking parity and deterrence with India, and contesting leadership in the Islamic world has incentives to develop ASAT capability." Any of these states could jam, dazzle or laze the others satellites. From there, all bets are off.

Beyond the cislunar space between Earth and the Moon, the great powers are developing the capacity to project power to Mars and asteroids, based on stepwise lunar settlement and beyond. The appetite of great powers to proliferate vertically the reach of their weapons of mass destruction has no apparent limit.

Nuclear Fuel Cycles and Horizontal Proliferation

John Carlson brings us back to Earth by examining horizontal proliferation arising from the construction and operation of nuclear fuel cycles spread across the region. The region already is a nuclear-armed crowd, containing three of the five NPT-designated nuclear weapons states (NWS)—the United States, Russia, and China—and three non-NPT nuclear-armed states—India, Pakistan, and the DPRK—the only NPT non-NWS to have left the NPT (in 2003) and armed itself with nuclear weapons. Each developed a fuel cycle to provide it with fissile material, although India, Pakistan and the DPRK depended on outside suppliers and technical support along the way.

The safeguards system implemented by the International Atomic Energy Agency in Vienna rests on non-nuclear weapons states providing access and transparency to inspectors to ensure that any diversion of significant quantities (sufficient to make a nuclear warhead from enriched uranium or plutonium) is identified quickly enough to allow the international community to respond before a weapon is produced and tested. In cases such as Japan, this conversion or latency period may be

so short as to be almost zero, requiring very high levels of monitoring and access. In others, the period may be months or years, in which case IAEA's safeguards provides confidence to other states that non-nuclear neighbors intend to stay that way.

Yet, intention may be disguised by secrecy. In such instances, Carlson states: "Where a state develops enrichment or reprocessing capabilities in secret this is a clear sign of proliferation intent." Also, intention may evolve over time: "The situation is not so clear," he avers, "where a state develops such capabilities openly, under IAEA safeguards. The state may be deliberately establishing a nuclear weapon option—in this case motivation still precedes capability, but the state's intention is not obvious. On the other hand, the state at that time may be genuinely committed against acquiring nuclear weapons is not obvious." That is, "what is unthinkable today might be considered a necessity tomorrow. In such a case capability could influence motivation."

For this reason, acquisition of enrichment or plutonium production and processing capability always generates a demand for information to be provided by nominally innocent parties to states concerned about the risk this latency poses to their own security. If a non-nuclear state also acquires dual-use technologies that are useful to weaponize fissile material, other states may hold that there is *prima facie* evidence that nuclear weapons proliferation is now underway and demand more intrusive access to determine what is going on. Suspicions are doubled and tripled when other weapons-specific testing or development and testing of warhead delivery systems are identified or observed—as occurred most notoriously in this region with the DPRK's nuclear breakout in the last three decades.

If such activity is undertaken by a state in an insecure geo-strategic context, international concern may lead to counter-proliferation threats and deployments of conventional and/or nuclear forces that in turn accelerate the proliferation activity that are the cause for concern in the first place—and even lead other states to entertain acquiring their own nuclear forces, as Japan and the ROK have done at different times.

Carlson envisions that the only way to reverse these cycles of suspicion and mutual threat making is to shift legitimate but sensitive fuel cycle activities from national to multinational control. This management approach is applicable not only to non-nuclear states with latent nuclear weapons capabilities via their fuel cycle activities, but also to nuclear possessor states that are disarming nuclear weapons but retain large stocks of fissile material and the capacity to move it quickly from

civilian to military use. Until then, nuclear fuel cycles criss-cross the strategic landscape with constant risk of nuclear armament in areas previously devoid of nuclear threat.

Double Bluff and Extended Nuclear Deterrence in a Pandemic World

Allan Behm dissects the logic and underlying assumptions of “nuclear extended deterrence”—the distinctly American practice of projecting nuclear threat from home-based and forward-deployed nuclear weapons. Of course, there is no doubt that the United States is capable of using nuclear weapons in the region against adversaries such as China, Russia, or the DPRK. The critical question is whether it ever would do so on behalf of an ally, that is, are such threats against another nuclear-armed state ever credible, and from the view point of a nuclear-umbrella state, are the putative gains of marginal deterrence so gained worth the countervailing threats that may be made by the potential adversary, including risk-taking to force the United States to back off. While the United States and a potential nuclear adversary trade threats, Behm suggests that the state to which a nuclear umbrella is extended is left in a precarious position in which its existential security depends on an incredible threat working against a highly motivated adversary that amounts to a nuclear bluff.

In sum, “Extended nuclear deterrence theory has gradually morphed into a kind of deterrence theology—a belief system founded on a codified set of indemonstrable doctrines. The validity of the system rests on five implausible and ultimately unprovable propositions: that the guarantee is absolute and unconditional, that nuclear exchange escalation can and will be controlled, that the guarantor will accept the fact and consequences of a nuclear attack on behalf of the client state to which deterrence is extended, that the decision maker will make rational choices based on the logic of the guarantee, and that any possible aggressor will make its decisions based on the same strategic mindset as the guarantor. But each of these propositions is unsupportable.”

It follows, argues Behm, “Since none of these propositions is necessarily true, the validity of extended nuclear deterrence is ultimately dependent on irrationality—the irrationality of the guarantor decision maker accepting unimaginable consequences on behalf of a third party. The fact that the dynamics of war, which are instinctive and visceral, can be considered and analyzed rationally does not render them rational. And the obverse is true: while it may be comforting, it is irrational for the client state to regard extended nuclear deterrence as an ultimate guarantee of national security.”

Possessors of nuclear weapons always cast a shadow over other states, even if they do not intend to do so. But according to Behm, the introduction of nuclear extended deterrence in contested areas of the strategic landscape in Asia Pacific adds a volatility to conflicts rather than creating stability.

Chemical Weapons History, Science, and Prospect

As if the prospect of nuclear war arising from nuclear extended deterrence is not enough, the specter of chemical weapons remains present in this region. Jonathan Forman and Alexander Kelle revisit some of the darkest episodes of past wars to remind us of the experimentation and use of chemical weapons by Japanese imperial forces in China, the chemical armament of the great powers, US forward deployment of chemical weapons in Japan and its pursuit of “chemical extended deterrence” against DPRK chemical weapons in the Cold War, the stockpiling of home-grown chemical weapons by the ROK, and the removal and destruction of these stockpiles under the rubric of the 1997 Chemical Weapons Convention. (Here, as Forman and Kellerman explain, “chemical weapons” refers to chemicals with toxic properties used to harm humans and animals, which excludes incendiary chemicals, explosive chemicals, and herbicides.) Echoing this dark history, Japan and China conduct a joint, cooperative removal and destruction of residual Japanese chemical weapons from China that continues to this day, even during the pandemic.

As with nuclear fuel cycle facilities and fissile material, many chemicals are dual-use, that is, widely used in innocent commercial activity but also usable as weapons. Moreover, the development of other types of chemicals (such nanomedicines that target specific cells or tissues) expands the range of possible chemical attacks compared with the indiscriminate nature of chemical gases or weapons used in the past. The Organization for the Prohibition of Chemical Weapons that supports the Chemical Weapons Convention designates laboratories at the member state level including China, ROK, Russia, Singapore, and the United States to detect chemicals that may be weaponized and to support verification while states such as Japan and Malaysia have counter-chemical weapons laboratories.

Forman and Kelle observe that the general trend is that less states possess chemical weapons today, thereby reducing the chances that they would be used in war. Although there is no publicly available hard evidence, the DPRK is widely assumed to be the only state in the region with a

deployable chemical weapons arsenal for use in artillery and rocket shells. A credible threat of non-state actors weaponizing commercially available chemicals also exists in the region since the Japanese cult Aum Shinrikyo used sarin gas in the Matsumoto and Tokyo subways in 1994 and 1995 respectively.

Biological Weapons and Nuclear Deterrence in the Pandemic Era

Completing the dismal picture of WMD in the region, Richard Pilch and Miles Pomper examine the potential re-emergence of already banned biological weapons due to the pandemic on the one hand, and the possible incentive to obtain chemical weapons on the part of already nuclear-armed states face in posing a credible threat of use of nuclear weapons on the one hand, or the difficulty that some non-nuclear states face in obtaining their own nuclear weapons in the first place.

Biological weapons have an odious history in the region starting with Japan's biological weapons program in China involving experimentation on prisoners of war that killed more than 10,000 prisoners of war and others and use in attacks that killed upwards of 200,000 people, mostly civilians. During the Cold War the United States developed biological weapons, but in 1971 it unilaterally banned its own use. The Soviet biological weapons Cold War program was aimed at the United States and China, and it continued development of such weapons even after joining the Biological Weapons Convention that came into force in 1975. Although the DPRK possesses the materials and skills to make biological weapons, there is no evidence that it seeks or has such at the moment, and none of the other nuclear powers in the region such as India or Pakistan are thought to have offensive biological weapons.

Due to the potency of bioweapons, some nuclear-armed states such as the United States and India have reserved the right to use nuclear weapons in response to bio-attacks on their forces, thereby raising the possibility of a mistaken attribution of a natural outbreak or natural pandemic that leads a state to use nuclear weapons. This risk is particularly salient to the Korean conflict where the DPRK has long held that it was attacked by US bioweapons in the Korean War, albeit falsely. Thus, the DPRK may be inclined to view a natural outbreak as originating from the United States or the ROK as part of their effort to destabilize or remove the regime. In short, how biological events that might be attacks are attributed is a critical issue that bears on the risk of war and nuclear war, and there is no clear common understanding between nuclear possessor states on this issue.

The raw materials and technology for biological weapons are dual-capable and spread across the entire region. The primary bulwark against misuse of these building blocks or actual deployment is early detection. Thus, Pilch and Pomper argue that states should create a pro-active network of detection, using many of the same tools that are essential to monitoring and then responding to spillover of pathogens from natural reservoirs that lead to pandemics such as coronavirus SARS-CoV-2 or better known as COVID-19.

The pandemic reminds us that bioweapons also present a unique non-state actor attack vector whereby an already infected individual sets out to spread contagious disease with potentially devastating health and psychological impact on targeted populations. Such an individual may be motivated by ideology or state-sponsored and would present great difficulty in attribution and response.

India-Pakistan Nuclear Confrontation

In Section 1 we saw that WMD range from the molecular to extra-terrestrial and that the capabilities to make and deliver such weapons are scattered across the Asia-Pacific region. Of the three types of WMD, the threat is heavily weighted on the nuclear end of the scale in East Asia and South Asia, dominated by six of the world's nine nuclear-armed states and three of its nuclear umbrella states.

In this section, we examine how these weapons might be used where vital interests of states collide in Northeast Asia, East Asia-Taiwan, and South Asia.

Rakesh Sood traces the evolution of the Indian-Pakistan conflict embedded in an inherently triangular nuclear threat system with China. Perhaps in no other nuclear-prone conflict is the weight of colonial history so directly linked to the adoption of nuclear forces. As Sood explains, the Indo-Pakistani conflict is rooted in the very creation of these two states and the 1947 partition of Pakistan from India and their claims to both govern Kashmir and Jammu leading to multiple clashes, wars, and now state-sponsored, cross-border terrorism.

India's nuclear arsenal was adopted to project nuclear threat against China *and* Pakistan and to countervail their nuclear threats to India, whereas Pakistan's nuclear arsenal is aimed only at India to offset India's conventional and nuclear forces. India's two-front nuclear challenge combined with its No First Use doctrine requires it to rely on conventional military and non-military means

to respond to Pakistan's incursions, enabling Pakistan in turn to assert its prerogative of nuclear first-use and to forward-deploy its tactical nuclear weapons to emphasize this choice.

Sood examines seven instances of conflict between India and Pakistan, five of which came after 1998 by which time both were nuclear-armed and nuclear threat began to play an explicit role. If these instances prove anything, it was that nuclear threats by India could not stop Pakistani-supported terrorist attacks or conventional conflict with it, and that risk-taking including that presented by tactical nuclear weapons deployed in conflict zones by Pakistan worked to activate third parties to intervene to prevent further escalation, short of the nuclear threshold. In effect, Pakistan relies on risk-taking to induce third parties to intervene with India on its behalf at the height of crises—a strategy that has worked on multiple occasions. Sood finds that the United States was key in recent instances of such “climb down” diplomacy, with Saudi Arabia and the United Arab Emirates also playing a role. China too was involved, but India is not likely to accept this role in the future. “In short,” he concludes, “external actors may not be able to provide off-ramps in the future as readily as in the past.”

Given these realities and Pakistan's likely continued use of terrorist attacks on Indian targets to initiate conflict with India and the improbability that the international community will prevail on Pakistan to change this strategy, the risk of inadvertent nuclear escalation will continue no matter how much India tries to block Pakistan. It is critical, therefore, that minimal crisis management communication lines are kept open and, in the future, bilateral and trilateral dialogues begin on shared understandings on a range of nuclear-related risks at the earliest possible time.

Taiwan Straits

If Pakistan and India have developed a tripwire for escalation to nuclear war in their contest over disputed territory, Robert Ayson argues that the People's Republic of China (hereafter China) and the United States have set up the conditions that could spiral to nuclear war in the Taiwan Straits due to the intersection of political friction between China and Taiwan (over which China claims sovereignty, recognized implicitly by most states) with US-China strategic competition.

Ayson argues that although it is not easy to start a nuclear war in the Taiwan Straits, the risk is real and derives from the asymmetry of forces in the conventional military balance between

China and the United States on the one hand, and the propensity of the Taiwanese leadership to seek independence on the other.

Historically, the United States' ability to muster massive conventional naval and aerial force in the Western Pacific buttressed by its willingness to arm Taiwan to defend itself provided overwhelming superiority to China's mainland-based forces. But over the decades, the balance has tilted to the point that China can now pose a lethal missile threat to US aircraft carriers and regional airbases such as Guam, Okinawa, and Kunsan as well as Taiwan itself while mounting a cross-strait invasion force. Not since the 1958 Quemoy Matsu crisis has the United States had to entertain the risk of nuclear escalation over the Taiwan Straits as it must do today.

The "balance of resolve" between the United States and China, suggests Ayson, is based on their perception of each other's ability to dominate as they escalate to ever greater conventional and then nuclear force, and their resolve that the benefit of victory is worth paying the price of such escalation. There remains little doubt that the United States ultimately has superior nuclear forces with which to punish China's nuclear and conventional forces. The issue is how to avoid approaching the nuclear threshold of China or the United States and which state is more or less deterred by nuclear threat at lower levels of violence than all-out nuclear war. Escalation by either side using cyberwarfare, nuclear or conventionally-armed dual use missiles, and other steps could lead to a "murky twilight zone" between rapid escalation and crossing the nuclear threshold.

At stake for China is the political legitimacy of its leadership if it does not assert sovereign control over Taiwan should it declare independence. For the United States, its reputation as a great power patron to its allies at a global level is on the line, in what is the first great test of declining US hegemonic power against China rising from centuries of humiliation at the hands of the West.

Given that there is no way to easily reduce the stakes in the Taiwan Straits conflict, Ayson suggests that the antagonists reduce ambiguity by creating no-go zones whether in cyberspace or physical space, reinstating tacit understandings about the status of Taiwan, and signaling that attacks on command-and-control systems are off limits, all of which are necessary to their mutual recognition of the "urgency of enhanced communication, cooperation and restraint."

DPRK Asymmetric Nuclear, Cyber, Bio, Chemical Forces

As with the India-Pakistan and Taiwan Straits conflicts, the risk of nuclear war in Korea is rooted in a division of a nation combined with unresolved historical conflicts. Lee Sang-Hyun suggests that the DPRK's "asymmetric" military capabilities enable it to overcome the inferiority of its conventional military force by exploiting weaknesses of countervailing US-ROK and UNC allied forces. Accordingly to Lee, the core of its asymmetric forces are its nuclear weapons, missiles, cyberwarfare forces, and chemical and possibly biological weapons. Given the DPRK's asymmetric force advantages and the small geographical area in which war would be fought, the ROK has invoked US nuclear extended deterrence to offset its vulnerability to these asymmetric threats.

The DPRK is estimated to have between twenty to sixty nuclear weapons as of early 2021. It has demonstrated short and intermediate missile delivery systems and possibly the ability to fire a long-range missile that would hit the US mainland.

Since the collapse of the Kim-Trump summit in Hanoi in 2019, the DPRK tested a host of short-range, solid-fueled missiles that may be capable of delivering nuclear warheads. It also displayed new, huge long-range missiles that have yet to be tested, perhaps signaling an intent eventually to develop multiple re-entry vehicle payloads—although it has yet to test even a single re-entry vehicle on a long-range missile. It has also fired missiles from underwater signaling an intent to deploy nuclear weapons at sea in the future.

Lee suggests that DPRK cyberattacks rather than nuclear attacks against US-ROK forces are cheaper and more likely to succeed. Cyberattacks can be launched early and with some level of ambiguity in the runup to a conflict, so they are not only cheaper and faster to use than conventional or nuclear weapons, they are also more adaptable to signaling resolve and to inflicting damage on the vulnerabilities of US and ROK highly informatized weapons systems, and also against critical infrastructure such as banks, public utilities, and even nuclear reactors, all of which are vulnerable to cyberattack.

The DPRK may also have chemical and biological weapons, but Lee notes there is little hard information available whereas its nuclear and cyber weapons are already well demonstrated. Lee suggests that the DPRK might use nuclear weapons to make China intervene in a conventional offensive against the DPRK that occurs either inadvertently or on purpose across the Demilitarized Zone. It might "asymmetrically escalate" by delegating use authority to commanders in an obvious

way to impress on adversaries its appetite to take risk as a way to force some accommodation of its demands—not unlike Pakistani deployment of tactical nuclear weapons to forestall Indian conventional attack in a crisis. Such asymmetric use necessitates the DPRK keeping enough nuclear weapons in reserve to be able to stop escalation to all-out ad/or nuclear war if engaged in dangerous provocation or offensive but limited conventional operations against the ROK.

Standard confidence building measures are unlikely to work with the DPRK, concludes Lee, in part due to the nature of the DPRK's polity, but also because the wellsprings of trust have been poisoned for so many decades by all parties to the Korean conflict. As the standoff is likely to continue and even deepen for the foreseeable future, in addition to acquiring offsetting capabilities to the DPRK's asymmetric forces, Lee concludes that it is prudent to press the DPRK to become “a normal state in Northeast Asia via a peace process on the Korean Peninsula in the long run.”

Risk Reduction Measures

In section 3, authors scan the horizon for possible ways to reduce the risk that WMD—especially nuclear weapons—use might be used and related non-proliferation and disarmament strategies in Asia-Pacific.

Dmitry Stefanovich observes that the most important Cold War era arms control and incident prevention agreements were bilateral between the United States or one of its allies and the former Soviet Union. These treaties codified lessons learned from nuclear crises such as to the need to keep lines of communication open, and they led to the jointly developed concept of “strategic stability,” that is, nuclear commanders should always act in ways that reduce the adversary's incentive to attempt a disarming nuclear first-strike. He notes that none of these treaties were aimed primarily at the Asia-Pacific region. In any case, legacy arms control agreements that created common security and increased transparency that extended to this region have mostly unraveled with the United States and Russian emphasizing instead reliance on military and nuclear capabilities and increased ambiguity. Perhaps most worrisome is that the new generation of leadership in each great power has not lived through the horrors of World War II, the Cold War, and many of the “local” wars in which millions perished. Few if any have ever seen a nuclear explosion first-hand.

Stefanovich suggests that rather than proposing improbable strategic arms treaties or abstract, high-level “risk reduction” architecture at the level of P5 (the five permanent and nuclear-armed

members of the UN Security Council), it is more useful to identify ways to concretely reduce risk in each of the specific nuclear-prone bilateral and multilateral “deterrence equations” in which nuclear threat is present. He suggests that risk reduction measures be focused on five common interests of all nuclear-armed states. These are (a) setting limits on the number and patrol areas of ballistic missile-firing submarines to reduce fear of leadership-decapitation or force-disarming strikes using submarine-launched missiles fired from a short distance offshore below early warning radars and arriving in only a few minutes; (b) decoupling nuclear weapons from aircraft staging bases so that non-strategic nuclear weapons are more transparent and less easily deployed without being noticed; (c) establishing a regional, multilateral long-range missile and space launch rocket notification regime drawing on networked, national early warning radars that would enable states to monitor and verify compliance with the regime and departures therefrom; (d) establishing hardened, modernized, and harmonized multilateral hotlines between the capitals of the region for transmission of missile launches and for crisis communications to depoliticizing incidents that will assuredly occur by design or by accident; and (e) reinforcing the now customary nuclear use taboo by more stringent application of the Law of Armed Conflict to nuclear operations of all kinds.

Trilateral Confidence Building Measures in South Asia

Taking up the Pakistan-India-China nuclear triangle outlined by Rakesh Sood in section 2, Feroz Khan identifies trilateral confidence building measures to reduce this risk. As Khan puts it: “At the trijunction of three nuclear-armed countries, the potential of major regional military crises—either between India and Pakistan or India and China—is increasing, and it could escalate to a major conventional war and nuclear catastrophe.”

To find such measures is not easy given the long trail of failed past agreements and bilateral peace-making initiatives between India and Pakistan on the one hand, and China and India on the other. Khan recognizes that shifts in the strategic landscape itself—in particular, in the geoeconomics of trade, investment, and financing of infrastructure between China and India—contain clues as to what might work instead of repeating past failures.

He notes that China’s primary strategic concerns lie to its east and north, and the negative trends on these fronts evokes its growing military and nuclear force capabilities that create anxiety for India which responds with its own upgrade of nuclear forces thereby driving Pakistani threat perceptions. As noted by Sood and affirmed by Khan, India’s no-first-use posture with respect to

China drives it to pose a conventional military response to Pakistani provocations or attacks, under Pakistan's nuclear threshold. Pakistan in turn attempts to drive down this threshold by forward-deploying tactical nuclear weapons and making its own use doctrine ambiguous.

Faced with this escalation interlinkage, Khan proposes that China, India, and Pakistan undertake a dialogue or trilateral dialogue noting that it is critical to overcome media hype and domestic political fearmongering that has driven past crises. More concretely, he suggests that the previously bilateral strategic restraint regime (SRR) between India and Pakistan in 1998 that comprises of linked conflict resolution processes, conventional force restraints, and nuclear restraints be transformed into a trilateral SRR by adding China and capitalizing on the agreement to undertake regional conflict resolution by (a) conducting two separate sets of bilateral conflict resolution; (b) promoting economic interdependency and shared prosperity; (3) restraining conventional forces with deployment limits and low force zones; (4) restraining nuclear threat by doctrinal assurance and non-alerting status; and (5) establishing a modernized nuclear hotlines at level of head of state while also expanding the scope of the existing India-Pakistan non-attack agreement to include non-attack on nuclear command, control, and communication (NC3) including cyberspace.

In short, according to Khan the way forward is to transform the region from the existential security-centric relationship into one that is more of an economic-centric relationship. Whether this is possible in a post-pandemic period is unclear, but the vision is clear.

Nuclear Proliferation by ROK and Japan?

Moon Chung-in examines the prospects that Japan and/or the ROK might seek independent nuclear forces due to the resurgence of pro-nuclear weapons policy currents in both countries driven in part by the threat posed by the DPRK's nuclear breakout in a falling domino-like effect. If this were to occur, the conditions for "mutual probable destruction" would be proliferated in Northeast Asia and any chance of restoring a modicum of "strategic stability" would be lost irrevocably.

In the ROK, Moon finds that there is a teleological school that promotes 'nuclear sovereignty' based on the logic of 'nuclear for nuclear' and seeks nuclear armament regardless of American stance. It competes with an instrumentalist school who push for a conditional, independent nuclear armament based on enhancing the credibility of US nuclear extended deterrence by either redeploying US tactical nuclear weapons (withdrawn in 1991) or by engaging in a NATO-style

nuclear weapons-sharing agreement on a bilateral or trilateral (NEATO) arrangement. The instrumentalist school has the upper hand in the public debates, but both advocate that the ROK shift from nuclear latency to nuclear armament—posing a challenge to American nuclear hegemony in the region, dooming any denuclearization deal with the DPRK, and raising the threat of Japanese proliferation that would assuredly follow from the ROK nuclear armament.

In fact, likewise driven by the DPRK's nuclear armament and related missile testing, Japanese conservatives have reactivated old Japanese debates about an independent nuclear force with a view primarily to using Japan's nuclear weapons latency as a political weapon in relations with an ever-more assertive China. Unlike the ROK, Japan's public opinion polls show the majority of the population to be opposed to Japan's nuclear armament to the deeply rooted nuclear taboo originating in the Hiroshima-Nagasaki traumas, and Japan is also constrained by its adoption in 1967 of its three non-nuclear principles of not possessing, producing, or introducing nuclear weapons. But as with the instrumentalist school in the ROK, the pro-nuclear weapons policy current in Japan enables Japan to try to be a tail wagging the superpower dog, that is, to push the United States to raise the credibility of its nuclear extended deterrence commitments to Japan in spite of US disinclination to do so under multiple US presidents since the turn of the century.

Both the ROK and Japanese governments have resisted being drawn into this loose talk of nuclear weapons proliferation and observe stringent monitoring and verification of their nuclear materials facilities and stocks of fissile material. Thus, while these two states could break out very quickly and have the necessary missile delivery technology also available, neither is likely to do so short of a major alliance rupture or an actual war in the region that shreds American credibility. Both are committed to increasing conventional forces to deter their respective adversaries, and while these pro-nuclear policy currents have some cross-border connections with each other as well as with similar voices in the United States that support the idea of allied proliferation, civil society groups in the ROK and Japan are forming countervailing coalitions opposed to nuclear armament while also addressing the risk of counterforce dilemmas arising from conventional forces that may evoke more, not less nuclear threat from the DPRK and even China.

As the South Korean survey data shows, supporters of nuclear armament can change their view after being exposed to data related to costs and constraints of going nuclear. Thus, there should be national and international efforts to educate citizens on the danger of nuclear weapons by

disseminating timely and objective information. Moon notes further that ROK pro-nuclear sentiment declines when political and military tension falls in the peninsula, suggesting that the most constructive way to avoid further nuclear dominos falling in Northeast Asia may be to make peace in Korea as fast as possible.

Nuclear Weapons-Free Zones

Regional nuclear weapons-free zones (NWFZs) are one of the oldest risk reduction measures that endure in spite of great power transitions and regional turbulence. NWFZs provide security not only to the non-nuclear weapons states party to a NWFZ treaty, but also to the nuclear weapons states in the region. Three such zones exist in the region, viz: the South Pacific, Central Asia, and Southeast Asia NWFZs, plus the Mongolian NWFZ recognized as such by the P5 if not under international law.

Tuya Nyamosor examines how each of these NWFZs were created. Although all follow the standard UN treaty NWFZ format, they are also tailored to local circumstances. The South Pacific Zone not only responded to French nuclear testing in the Southwest Pacific, but banned all nuclear testing—peaceful or otherwise. It also gave Indonesia confidence that Australia would not arm itself with nuclear weapons. The Southeast Asian NWFZ extended its jurisdiction to transit of national waters and to the 200 nautical mile Exclusive Economic Zone, putting pressure on the nuclear weapons states who have so far refused to sign and ratify the treaty. The Central Asian NWFZ is the first zone in which nuclear weapons had been deployed (in Kazakhstan) and removed at the end of the Cold War, has two bordering nuclear-armed states, and encounters volatile conflicts in all directions. As a former nuclear test site is located in the region, it has strong environmental rehabilitation provisions as well as banning nuclear tests. Finally, Mongolia has pushed hard to get political recognition of its unilateral nuclear weapons-free status and promotes learning from and coordination with other NWFZs.

In spite of these achievements, these NWFZs have limited utility. Recognized in the NPT itself as a valuable way to reduce the threat of nuclear war, NWFZs are only an interim step on the long road to nuclear disarmament. Indeed, the guarantees provided by nuclear-armed states to the non-nuclear parties of non-attack with nuclear weapons are based ultimately on their ability to revert to nuclear threat should a non-nuclear state break out, or should a nuclear weapons state threaten to or actually use nuclear weapons against a non-nuclear weapon state party to the treaty. And, to

date none of the treaties have been ratified fully by nuclear-armed states, giving them legal enforcement resting on domestic, not the force of international law.

Nonetheless, drawing on these and other precedents (especially from Latin America), Northeast Asia has been proposed for the next NWFZ in the region, partly to enable the denuclearization of the Korean peninsula, but also to contain the proliferation impulses in the ROK and Japan.

Prospects for the Treaty on the Prohibition of Nuclear Weapons

Given the failure of the nuclear-armed states to resolve their conflicts with each other or non-nuclear states, and given the increasing dependence on nuclear threat as a basis of international relations, many civil society organizations and many states have concluded that it is time to revolt against the hegemonic role of nuclear weapons and to simply ban them outright. This sentiment, motivated in large part by revulsion at the humanitarian impacts that a nuclear war would have on human populations as well as putting Earth's biosphere at risk, led to the campaign for the Treaty on the Prohibition of Nuclear Weapons (TPNW) signed into existence in New York in 2017 and ratified to come into force on January 22, 2021. The TPNW covers the entire gamut of nuclear weapons activity, not just the fissile material or delivery system. This includes all the supporting infrastructure that makes nuclear weapons usable and nuclear war possible, including that hosted by non-nuclear states (often but not always nuclear umbrella states). It also bans threatened use of nuclear weapons. Predictably, the nuclear-armed states in the region have either rejected the treaty altogether or simply ignored it; US nuclear allies have also rejected it; but as of mid-2021, nine ASEAN member states signed and four ratified the treaty, and nine of the Pacific Island states party to the South Pacific NWFZ signed or acceded to the treaty.

Nobuyasu Abe explores how to overcome the gridlock between the TPNW and the NPT. He suggests that the credibility of the NPT must be restored by the NPT Nuclear Weapons States making real nuclear disarmament progress, deceleration of their modernization and competition, and undertaking risk reduction measures alongside regional conflict resolution and new nuclear weapons free zones, strengthening the IAEA safeguards system, blocking the naval propulsion-highly enriched uranium loophole in the NPT, and preventing small reactor deployment. Concurrently the TPNW ratifying states must address the missing elements of their proposed prohibition regime on robust verification for proposed measures, clarify key definitions in the treaty itself and enter into dialogue with NPT states, and hopefully participate in the covid-

postponed NPT review conference when it finally takes place. He suggests that a number of countries are well placed to build bridges between NPT and TPNW states such as New Zealand and Indonesia in the Asia-Pacific region. Finally, he argues that it is critical to maintain the historical memory of the horrific consequences of past nuclear bombings to delegitimize and constrain nuclear use.

Richard Tanter also identifies the practical and legal obstacles that block the TPNW from making a credible claim to have banned nuclear weapons on a universal basis. In particular, the monitoring and verification requirements to determine compliance are complex and confront many dual use systems that will be difficult and even impossible to disentangle from systems that support nuclear operations, directly or indirectly. These tasks lie at the core of the TPNWs potential to actually offer a nuclear weapon elimination pathway in contrast to its ability to stigmatize or delegitimize nuclear weapons of mass destruction, important as these tasks may be to reducing the utility of nuclear weapons to possessor states.

Tanter identifies a number of key tasks that must be undertaken to advance the TPNW agenda, including dialogue between regional nuclear umbrella and prohibition states, pushing for clarity on nuclear guarantees from the United States to allies and related risks, and doing everything possible to make one or more nuclear-armed state in this region abandon its nuclear armament and commit to the prohibition of nuclear weapons.

Conclusion

As noted earlier, we observe that WMD, especially nuclear weapons, confront commanders with the same imperatives and confront them with the same dilemmas wherever they are located. Arguably, these shared features of WMD landscape force all possessors of nuclear states to make tradeoffs along the same axes of choice, either purposely or by default. To remind, these tradeoffs include the following:

1. **Transparency versus opacity:** Making possession of nuclear weapons capacities *transparent* so that the weapons speak for themselves (for example, by revealing location of nuclear forces on a regular schedule in a manner that can be monitored and verified by an adversary exemplified by US-Soviet/Russian arms control treaties, or testing of nuclear

weapons or periodic testing of missiles to demonstrate capability undertaken by all nuclear armed states to date¹⁷) *versus* keeping capacities *opaque* to increase uncertainty and to minimize vulnerability (for example, by withholding all visibility and access, for example, to suspect chemical plants or biological research facilities such as chemical weapons capabilities developed and undeclared by the ROK even in the course of dismantlement, and even using deception to mislead an adversary as to status of nuclear forces or commander propensity to use—as when Richard Nixon and Henry Kissinger “secretly” alerted US nuclear forces from October 13-30 1969 to put pressure on the Soviet Union to pressure Hanoi to end the Vietnam war).¹⁸

2. **Certainty versus uncertainty:** Declaring intention to use nuclear weapons clearly, openly, and with *certainty* (for example, by having dedicated, nuclear-only forces such as US strategic missiles, openly forward-deploying tactical or theater nuclear weapons, or adopting a “No First Use” policy matched by demonstrable practice of separating warheads from delivery systems) *versus* creating *uncertainty* as intention to use (for example, by making ambiguous, bellicose threats, testing in the midst of a tense military standoff, as occurred in the Donald Trump-Kim Jong Un rhetorical war in 2017).
3. **Positive versus negative control:** Ensuring that nuclear weapons *always available for use* with effective positive controls (for example, maintaining Launch on Warning posture, automated launch systems and hardened communications) *versus* ensuring that they are *never usable without legitimate direction* with effective negative controls (such as two-person rules, separation of warheads from delivery system, Permissive Action Links).
4. **Individual versus group decision-making:** Maintaining *dictatorial decision-making*, centralized control, and authenticated authority to use nuclear weapons (for example, in the United States and the DPRK where one person has absolute authority to order that nuclear weapons are launched) *versus group decision-making*, decentralized control, and even pre-delegated authority to use nuclear weapons (for example, in Russia, India, and China—although the group decision-making may collapse into a single commander under duress).

¹⁷ With the possible exception of Israel.

¹⁸ See W. Burr, J. Kimball, *Nixon’s Nuclear Specter: The Secret Alert of 1969, Madman Diplomacy, and the Vietnam War*, University Press of Kansas, 2015.

5. **Counterforce versus counter-value targeting:** Limiting nuclear weapons to *counterforce or military-only targets* with minimized civilian casualties (which only the United States and Russia have the technical means to do, even in principle, given the need to identify and target precisely military targets that may be moving quickly, although it is a reasonable presumption that US and Russian targeting quickly veers into de facto counter-value targeting based on “military necessity” due to unstoppable escalation once a nuclear war begins) *versus* planning to detonate them on “*counter-value*” or *population and/or economic recovery targets*, either deliberately or as “collateral damage” from targets hit out of military necessity (as is surely almost inevitable given the short range and imprecise real-time targeting capabilities of China, Pakistan, and the DPRK).
6. **Minimum versus maximum deterrence:** Achieving “*minimum*” *deterrence* derived from assuring that a first-strike nuclear aggressor is likely to be hit by surviving nuclear forces even after absorbing a first-strike, irrespective of the level of destruction wrought on the target of a nuclear first strike (long China’s strategic goal, possibly that of India with respect to China, Pakistan with respect to India, and the DPRK with respect to the United States) *versus* striving for “*maximum*” *deterrence* based on escalation dominance at every step and ultimate “victory” in a nuclear war (as appears to be the strategic goal of the United States with respect to all its adversaries by creating, testing, displaying key elements of the nuclear triad, Russia with respect to the United States and China by its own emulation of US practices supplemented by extreme delivery system diversification and testing activity, and India with respect to Pakistan).
7. **Autarchic versus interdependent nuclear security:** Striving for autarchic nuclear security based on nuclear threat (evidently China, Russia, DPRK, and India’s posture) *versus* interdependent nuclear security created by collaboration with allies and even with adversaries via technology sharing and sales, and by mutual arms control and/or disarmament agreements (as enshrined in US nuclear alliances with Japan and the ROK, and possibly Pakistan and India).

Table 2: Nuclear Force Posture Tradeoffs

Transparency	Opacity
US, Russia	DPRK, China, India, Pakistan
Certainty	Uncertainty
US, Russia, China, India	DPRK, Pakistan
NC3 Negative Bias-Never Use by Mistake	NC3 Positive Bias-Always Available for Use
US, Russia, China, India	DPRK, Pakistan
Dictatorial Decision-Making	Group Decision-Making
US, DPRK, Pakistan	Russia, China, India
Counterforce Targeting	Countervalue Targeting
US, Russia	China, India, DPRK, Pakistan
Maximum Deterrent	Minimum Deterrent
US, Russia	China, India, DPRK, Pakistan
Interdependent Nuclear Security	Autarchic Nuclear Security
US	China, India, DPRK, Pakistan

In Table 2, we cluster states with respect to how each state made each tradeoff. Unsurprising, the choices that states make on each of these tradeoffs diverge, in some cases radically. The overall posture of a given state is the result of all seven choices, whether these are made explicitly or *de facto*. There is no *a priori* reason that the choices made by a given state should be consistent. In fact, organizational theory suggests the opposite. Nonetheless, this broad-brush treatment highlights the variation in how nuclear-armed states project nuclear threat, cause fear in the minds of their adversaries, and themselves perceive and experience nuclear threat. Driven by the imperative inherent in arming with nuclear weapons but shaped by unique local internal and external factors, each state reveals its own nuclear threat *modus operandi* which becomes manifest in its revealed intentions, declaratory rhetoric, deployment patterns, and use of forces such as alerts or forward-deployments to send signals about intention as warnings to nuclear adversaries.

Thus, one finds that all nuclear weapon states “speak” with a common vocabulary of the various elements of nuclear threat-making such as bases, missile test ranges, WMD factories, deployment

sites and platforms (such as silos, airfields, ports, ships, missiles and aircraft)—but the shared vocabulary may not convey the same meaning to those using it; and it does not extend to many elements that are deliberately not displayed, may be completely invisible such as command posts, communication nodes, organizational structures, or are shared with or indistinguishable with infrastructure that supports conventional forces.

For all these reasons, the stories inscribed in a “WMD landscape” are specific to each nuclear-prone conflict. We find from the investigations reported in this book that there are no simple rulebooks nor overarching principles that determine how nuclear weapons affect international relations in a specific, nuclear-prone conflict. Even norms of behavior in relation to WMD are hard to come by. None are universally accepted by nuclear weapons possessor states, and all are contested in one way or another by one or more nuclear-armed state. Some states declare that they will not be the first to use nuclear weapons; others assert that prerogative and reject No First Use as mere declaratory rhetoric. To date, perhaps the only nuclear norm that might be held to be universal in the region is the view that nuclear weapons must never be used again, the “nuclear taboo.” Whether and how long that view will hold is anyone’s guess.

Moreover, there are no travel guides on how to exit from this WMD-laden landscape, especially the areas saturated by nuclear threat. How the common dimensions of nuclear threat combine uniquely in each of the nine nuclear forces, and how each nuclear command perceives nuclear threat via its own strategic prism means that not only are the nuclear forces of each nuclear-armed state incommensurate, but also, no two nuclear threat-based relationships are the same—especially when three or more states armed with nuclear weapons are party to the same conflict. Consequently, the terrain and contours that capture how nuclear weapons are embodied in the WMD landscape are convoluted and twisted, sometimes grotesquely, in ways that are specific to each nuclear threat relationship and to each actual conflict in which nuclear threat is employed, the latter also being in flux as geopolitical circumstances shift over time.

That said, we find eight broad themes emerged in the course of this survey that are common across the entire region and demand that policy makers and stakeholders respond in ways that reduce the risk of nuclear war and promote the control and disarmament of WMD, especially nuclear weapons. These include:

1. *Nuclear, chemical, and (to the extent that they still exist and are deployable) biological weapons are inextricably intertwined with conventional forces in international conflicts.* Because one or both nuclear-armed states or their allies in such a conflict fear that they may be overwhelmed by conventional attack, these nuclear possessor states supplement and even substitute for conventional deterrence with nuclear threat. Perhaps more often than not, possession and reliance on nuclear weapons reveal strategic weakness, not strength, and are a weak straw on which to base a national security strategy. It follows that all states should minimize the role of nuclear weapons and recess those that exist while rectifying conventional force deficits, or use non-military means to ameliorate or resolve conflict over time.
2. *Relatedly, the diffusion of low-yield nuclear weapons, disruptive technologies and ever more lethal conventional weapons accelerates this intermingling and blurring of nuclear and conventional forces that increases the risk of war and thereby, nuclear war.* It is critical, therefore, to interrupt this self-reinforcing cycle of conventional conflict laden with nuclear threat, especially in the Korean peninsula, Taiwan Straits, and in South Asia, noting that the parties to these conflicts range from non-state actors (Taiwan) to small and medium powers (DPRK, Pakistan) to great powers (India, China, the United States and Russia). It follows that states likely should re-structure their conventional forces as they disarm nuclear forces to avoid gaining overwhelming counterforce superiority that otherwise will incentivize an adversary to substitute nuclear force for conventional forces if they forego “equalizing” nuclear weapons. As an interim measure, nuclear-armed states should disentangle their nuclear and conventional command, control, and communications systems and delivery systems. In short, conventional arms control and disarmament are integral to the realization of nuclear disarmament and nuclear non-proliferation.
3. *Once adopted by a state, nuclear weapons beget more nuclear weapons.* First, the real and imagined threats posed to adversaries generates either vertical proliferation whereby a nuclear adversary expands their own nuclear armament to maintain “escalation dominance” so that it cannot be coerced by the other—an imperative that then ratchets across multilateral nuclear conflicts to cause other, less capable nuclear-armed states to respond in kind. Or, it activates a horizontal nuclear domino effect whereby a non-nuclear state perceives increasing nuclear threat and actively seeks and then obtains its own nuclear weapons. The reverse is

also the case, with the implication that successful multilateral nuclear arms control and disarmament must commence at the top of the nuclear hierarchy to reduce the pressure on lower ranked, less capable nuclear-armed states to proliferate with nuclear weapons.

It is critically important therefore that nuclear-armed states put their nuclear modernization programs on hold and re-examine these commitments to reduce cost and risk, and to avoid generating action-reaction arms racing, especially cascading effects across the rank hierarchy of nuclear-armed states that are linked to more than one adversary. Interim measures that facilitate such pauses and buy time include nuclear weapons-free zones, modernized nuclear hotlines, and new rules of the road agreements.

4. *The risk of nuclear war is incrementally and inexorably rising.* This finding follows from the increasing number of nuclear-armed states, the risk that non-state actors may obtain and use WMD, and the all too real possibility that nuclear commanders may lose control of their weapons leading to war and nuclear war at times of high tension and crisis. Conversely, we see that when peace takes hold and tensions fall, the risk falls correspondingly.
5. *Practical and realistic risk reduction measures should be taken in each nuclear conflict relationship that ameliorate the core, nuclear-prone conflicts.* Such measures must create the political and military conditions that allow vertical and horizontal proliferation to be reversed and create the geo-political space to realize “mutually assured interdependence” based on common values and shared interests, especially shared economic prosperity and ecological sustainability. Small steps may prepare the way for bigger steps and ideal but implausible measures should not be allowed to block tangible ones that kick-start a dynamic of arms control and disarmament. Possible measures include submarine-free zones, separating warheads from delivery systems, missile and rocket launch notification, shared early warning, and adoption of a global NC3 code of conduct based on the Law of Armed Conflict.
6. *Nuclear and other WMD operate and are interlinked at global, regional, and national levels.* The three global great powers not only confront each other’s nuclear threat, but they are also party to regional conflicts that involve middle and small nuclear-armed states and are susceptible to non-state terrorism. The nuclear forces that great powers deploy against each other also threaten their lesser nuclear adversaries, leading them to offset an increased threat with additional nuclear forces of their own. Due to this cascading effect down the entire global hierarchy of nuclear-armed states, each state has a strong interest in pushing the three

global nuclear powers to create new multilateral nuclear arms control and disarmament frameworks that relieve the pressure on lesser states.

7. *Truly existential threats such as global pandemics or global climate change demand immediate reduction of tension between nuclear-armed and nuclear umbrella states.* Even a small nuclear war could disable the ability of the international community to manage these twin global crises, and there are at least three locations in this region in which nuclear war is all too possible.

Conversely, the steps taken to resolve conventional conflict, reduce nuclear forces, and lower the risk of nuclear war create conditions in which chemical and biological weapons are even less likely to be used than they are already and would also create the political-security conditions that would enable joint efforts to overcome other existential threats.

8. *We are witness to an epochal shift whereby the primary conflict axis is between nuclear weapon and umbrella states to one in which non-nuclear, non-allied states must now be considered.* The nine nuclear weapons and thirty nuclear-umbrella states which rely on nuclear threat now confront the rest of the world—of which eighty-six states have signed the Treaty on the Prohibition of Nuclear Weapons as of the time of writing this paper.¹⁹ By this ratification, the prohibition states in this region are increasing their non-nuclear commitments made already in nuclear weapons-free zones in Central Asia, Southeast Asia, the South Pacific, and Mongolia, and if this trend propagates into a Northeast Asian WMD or nuclear weapons-free zone, then the nuclear-armed and nuclear umbrella states will find themselves under increasing diplomatic pressure to find common agendas with the nuclear prohibition states. For example, as John Carlson points out in this book, nuclear *and* non-nuclear weapon states need to employ multilateral safeguards on all fissile materials stockpiles in a manner that is monitored and verified to internationally agreed standards rather than the currently discriminatory system that exempts weapons fissile material from international inspections.

In his famous study *Landscapes Of Fear* (1979), Li-Fu Yuan explained that people have always lived in fear due to anxieties caused by exposure to threatening natural and artificial environments, in an attempt to impose order and predictability.²⁰ Yuan did not contemplate nuclear foreboding,

¹⁹ Treaty on the Prohibition of Nuclear Weapons, UNODA, <https://treaties.unoda.org/t/tpnw>

²⁰ Li-Fu Yuan, *Landscapes of Fear*, University of Minnesota Press, Minneapolis, 1979.

but others geographers such Kenneth Hewitt have after describing the horrific fate that befell scores of cities from conventional and nuclear annihilation in World War II.²¹ The scale of the killing of whole cities is one reason why nuclear target lists are the most secret aspect of WMD practice by states. In the few instances where targeting has been unveiled, it has been shown to be spectacularly irrational, exemplified by the targeting of tiny Ulan Bator in Mongolia, admittedly then a Soviet satellite state, by a 1-10 megaton thermonuclear weapon by the US Strategic Air Command in 1959;²² and by the utterly insane planned overkill on Russian targets in the US strategic target list as late as 1991.²³

Most people targeted directly or as collateral damage by nuclear weapons today are either unaware of living in the shadow of nuclear weapons, or they find themselves unable to do anything about it given the social and political distance separating them from those who are targeting them with nuclear weapons. Nonetheless, civil society in the Asia-Pacific region was the progenitor of the push to create the prohibition treaty, for which the Nobel Peace Prize was awarded in 2009. Civil society will continue to propagate strongly for the treaty in this region. Mayors for Peace, and the champion nuclear survivor cities of Hiroshima and Nagasaki are powerful voices in this push with unassailable moral authority.

²¹ K Hewitt, "Place annihilation: area bombing and the fate of urban places," *Annals of the Association of American Geographers*, 73:2, June 1983, pp. 257-284.

²² Strategic Air Command, "Atomic Weapons Requirement Study for 1950...sm 129-56," June 15, 1956, released under US FOIA request to National Security Archives, at: <https://nsarchive2.gwu.edu/nukevault/ebb538-Cold-War-Nuclear-Target-List-Declassified-First-Ever/>

Ulan Bator is designated in the urban-industrial target list at: <https://nsarchive.gwu.edu/nukevault/ebb538-Cold-War-Nuclear-Target-List-Declassified-First-Ever/documents/1st%20city%20list%20complete.pdf>

²³ D. Rosenberg describes the fantastic overkill in US nuclear war plans in "Nuclear War Planning," in M. Howard et al, edited, *The Laws of War*, Yale University Press, New Haven, 1994, pp. 160-190. See also D. Rosenberg, "The Origins of Overkill: Nuclear Weapons and American Strategy, 1945-1960," *International Security*, 7:4, Spring, 1983, pp. 3-71, at: <https://www.jstor.org/stable/2626731> The discovery between 1985-1991 of the full loss-of-control of US nuclear targeting by senior military and political leaders, and the targeting in some cases of hundreds of nuclear weapons on target sets in the US nuclear war plan is recounted by Frank Miller in "PART II: FRANK MILLER'S NARRATIVE" in F.C. Miller and G. Butler, "Masters of the Nuclear Weapons Enterprise," chapter 23, in Butler, George Lee. *Uncommon Cause - Volume II: A Life at Odds with Convention - The Transformative Years*, Outskirts Press, Kindle Edition, October 2015. Miller notes: "At some point, presumably in the 1970s, the war planners at the JSTPS [Joint Strategic Target Planning Staff] (without informing the Joint Staff or OSD, much less the White House staff) had decided to define a "city" in such a manner that had the President ordered a strike that included the cities withheld, all of those cities would nevertheless have been obliterated."

Surveying the WMD Landscape in Asia-Pacific

The nuclear prohibition states have made explicit the profundity of their commitment to hold the nuclear weapons and nuclear umbrellas states accountable, proactively, and before a nuclear war occurs. Meanwhile, nuclear-armed and nuclear umbrella states have reaffirmed their equal and opposite commitment to retain nuclear weapons, in effect, indefinitely. How long it will take for the first nuclear-armed or nuclear-umbrella state in this region to renounce nuclear threat and commit to nuclear prohibition is anybody's guess. Perhaps it will be the DPRK that overturns the established nuclear disorder by not only denuclearizing itself but by joining the prohibition treaty, forcing the ROK to follow suit. Or perhaps civil society will turn another nuclear umbrella state into a mouse that roared, following in the path of the Philippines anti-nuclear constitution (1986) followed by New Zealand's anti-nuclear legislation (1987). In the long run, therefore, we conclude that bottom-up, nuclear arms control and disarmament will commence in a mutually reinforcing dynamic that will reduce nuclear risk until the weapons are abolished and ultimately eliminated. Until then, we can only hope that our luck holds.